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SUBJECT: PRELIMINARY MONITORING RESULTS OF FIRST SPINOSAD AERIAL APPLICATION FOR MEXICAN FRUIT FLY ERADICATION IN VALLEY CENTER, SAN DIEGO COUNTY (STUDY 216)

On January 7–8 and 9–10, 2003, the California Department of Food and Agriculture's (CDFA's) contract applicator applied spinosad in San Diego County, California. The applications were the first of a series to eradicate the Mexican fruit fly in this area. During this application, the Department of Pesticide Regulation (DPR) collected surface water and deposition samples in the treatment area. Samples were also taken of the spinosad concentrate and tank mixture. Surface water samples were taken from Keys Creek, which runs through the eradication area. Deposition samples were taken at 26 sites, including three sampling sites within the Keys Creek buffer zone. None of the surface water samples contained detectable residues. One of the three buffer zone deposition samples contained 0.13 micrograms per square foot (µg/ft^2) and the other two had no detectable amount. The average amount at the 22 deposition sites was 1.61 µg/ft^2 (0.07 grams per acre, g/ac), 49% of the 3.26 µg/ft^2 (0.14 g/ac, or 35.1 µg/m^2) target application rate. The product samples showed an average concentration of 0.0210% versus a nominal label concentration of 0.0200%, and tank mixture concentration of 0.0090% to 0.0202% versus a target concentration of 0.0080%. No organophosphates, carbamates, and chlorinated hydrocarbons were detected in any of the product or tank mixture samples.

Introduction

CDFA has commenced a program to eradicate the Mexican fruit fly infestation in the Valley Center area of San Diego County, including aerial applications of spinosad. The eradication area consists of 28 square miles (mi^2), of which 23 mi^2 will be treated using aerial applications and 5 mi^2 around selected water bodies will be treated using ground applications. CDFA plans to aerially apply spinosad every two weeks for two life cycles of the pest to effectuate eradication.

Materials and Methods

The pesticide product used for this application was GF-120 NF Naturalyte Fruit Fly Bait (U.S. Environmental Protection Agency Registration Number 62719-498), containing 0.020% spinosad by weight (mixture of spinosyn A and spinosyn D) as the active ingredient. For application, the GF-120 NF was diluted with water to a tank mix target concentration of 0.0080% by weight of spinosad or 0.363 grams per gallon (g/gal). The first pesticide application occurred over two nights. On January 7 and 8, 2003 (Application Day 1), 1,100 gallons of spinosad mixture was applied over 2,394 acres (3.7 mi^2). On January 9 and 10 (Application Day 2), 4,150 gallons was applied over 12,326 acres (19.3 mi^2). The spinosad (active ingredient) target application rate was 3.26 $\mu g/ft^2$ (0.142 g/acre). For Application Day 1, the application started on January 7 at 9:00 pm and stopped on January 8 at 5:30 am Pacific Standard Time (PST). For Application Day 2, the application started on January 9 at 8:00 pm and ended on January 10 at 5:30 am PST. The applications were made using three fixed-wing aircraft, each with a swath width of 100 ft, sprayed in east and west directions at an altitude of approximately 500 ft. CDFA established buffer zones around several water bodies and excluded them from the aerial application.

Spinosad residues were measured in water and deposition samples. Background water samples were collected from Keys Creek before each application (Figure 1, attached). An application sample was collected after application on January 10. Deposition samples were collected using one ft^2 mass deposition sheets. Deposition sheets were set at 23 sampling sites dispersed throughout the treatment area (Figure 1). In addition, three deposition sites were sampled within the buffer zone around Keys Creek. The sheets were set at sampling sites before application and collected after application.

Deposition samples were stored on dry ice; all other samples were stored on ice until delivery to the CDFA Center for Analytical Chemistry for analysis. All samples were analyzed for spinosyn A and D, as well as spinosyn B, a breakdown product. The water samples were extracted with methylene chloride and analyzed using a liquid chromatograph with a tandem mass spectrometer detector (LC/MS/MS), providing a quantitation limit of 0.05 parts per billion (ppb). The deposition samples were extracted with methanol and analyzed using LC/MS/MS providing a quantitation limit of 0.1 $\mu g/ft^2$. The tank samples were extracted with acetone and analyzed using a high-performance liquid chromatograph and ultraviolet detector, providing a quantitation limit of one part per million (0.0001%). The tank samples were also screened for organophosphates, carbamates, and chlorinated hydrocarbons.

Results

Results of the deposition samples are listed in Table 1 (attached). On the first day of application, approximately 1/3 of the treatment area was sprayed (Figure 1). Consequently, 14 of the deposition samples collected were not analyzed. The amount detected from both application days ranged from no detectable amount to 4.14 µg/ft^2. The average of 22 sampling sites (excluded one site that was sprayed, but not sampled on the application day 1) was 1.61 µg/ft^2 (total spinosyn A, D, and B), 49% of the 3.26 µg/ft^2 target application rate.

One of the three buffer zone deposition sites had a detection of 0.13 µg/ft^2 spinosad (Table 2, attached).

Spinosad was not detected in any of the water samples (Table 3, attached).

The average concentration of the two concentrate samples was 0.0208% of spinosad active ingredient (Table 4, attached), compared to the nominal concentration of 0.0200%. The concentration of the two tank mix samples were 0.0202% and 0.0090%, compared to a target concentration of 0.0080%. No organophosphate, carbamate, or chlorinated hydrocarbon pesticides analyzed were detected in the tank mix, or the spinosad concentrate samples. A total volume of 5250 gallons of the tank mix was applied to 14,720 acres (23 mi^2). This is 500 gallons less than the target volume of 5750 gallons. If the tank mix contained the target concentration (0.0080%), the actual application rate would be 2.96 µg/ft^2 or 91% of the target rate (3.26 µg/ft^2, 0.14 g/ac, or 35.1 µg/m^2).

Results reported here are also available at DPR's Web site at <http://www.cdpr.ca.gov/docs/mexfly/>. To further address eradication efficacy and potential environmental effects, air and fruit samples will be collected in the later applications.

Attachments

Table 1. Monitoring results for deposition samples. The amount of spinosad is the total of spinosyns A, D, and B. The target amount is 3.26 µg/ft^2.

Site Code	Spinosad (µg/ft^2)		
	Application Day 1	**Application Day 2**	**Sum of Two Days**
1	Not Analyzed[a]	0.165[b]	0.165
2	1.584	0.054	1.638
3	0.369	None Detected[c]	0.369
4	1.304	0.281	1.585
5	0.335	2.035	2.370
6	Not Analyzed	1.286	1.286
7	Not Sampled[d]	0.263	Not Sampled
8	2.015	2.120	4.135
9	Not Analyzed	2.470	2.470
10	Not Analyzed	0.894	0.894
11	1.368	None Detected	1.368
13	Not Analyzed	0.596	0.596
14	0.963	0.281	1.244
15	2.637	0.054	2.691
16	0.103	1.455	1.558
17	1.913	None Detected	1.913
18	Not Analyzed	1.433	1.433
19	None Detected	0.592	0.592
20	Not Analyzed	1.592	1.592
22	Not Analyzed	None Detected	0
23	Not Analyzed	2.973	2.973
25	Not Analyzed	1.506	1.506
26	Not Analyzed	2.935	2.935
Average	**1.145**	**0.999**	**1.605**
Std. Dev.	**0.868**	**0.991**	**1.017**
Minimum	**0.000**	**0.000**	**0.000**
Maximum	**2.637**	**2.973**	**4.135**

[a] Sample not analyzed because the site was not treated on this day

[b] Sum of detected spinosyns A, D, and B, wherever trace amount (less than the quantitation limit 0.1 µg/ft^2 **)** was detected in the lab analysis, the quantity of (quantitation limit + detection limit)/2 µg/ft^2 was used to calculate the sum and average spinosyns in this report.

[c] None Detected, with a detection limit of 0.008, 0.020, and 0.028 µg/ft^2 spinosyn A, D, and B respectively

[d] Site not sampled due to field sampling problems

Table 2. Monitoring results for buffer zone deposition samples. The amount of spinosad is shown as the individual spinosyns.

			Spinosyn (µg/ft^2)		
Date	**Site**	**Sampling Interval**	**A**	**B**	**D**
1/10/03	12	Application Day 2	Tr[a]	ND[b]	ND
1/10/03	21	Application Day 2	0.128	ND	ND
1/10/03	24	Application Day 2	ND	ND	ND

[a] Trace amount less than the 0.1 µg/ft^2 quantitation limit detected
[b] None Detected, with a detection limit of 0.008, 0.020, and 0.028 µg/ft^2 spinosyn A, D, and B respectively

Table 3. Monitoring results for water samples. The amount of spinosad is shown as the individual spinosyns.

			Spinosyn (ppb)			
Date	**Site**	**Sampling Interval**	**A**	**D**	**B**	**pH**
1/7/03	28	Background Day 1	ND[a]	ND	ND	7.85
1/9/03	28	Background Day 2	ND	ND	ND	8.07
1/10/03	28	Application Day 2	ND	ND	ND	7.91

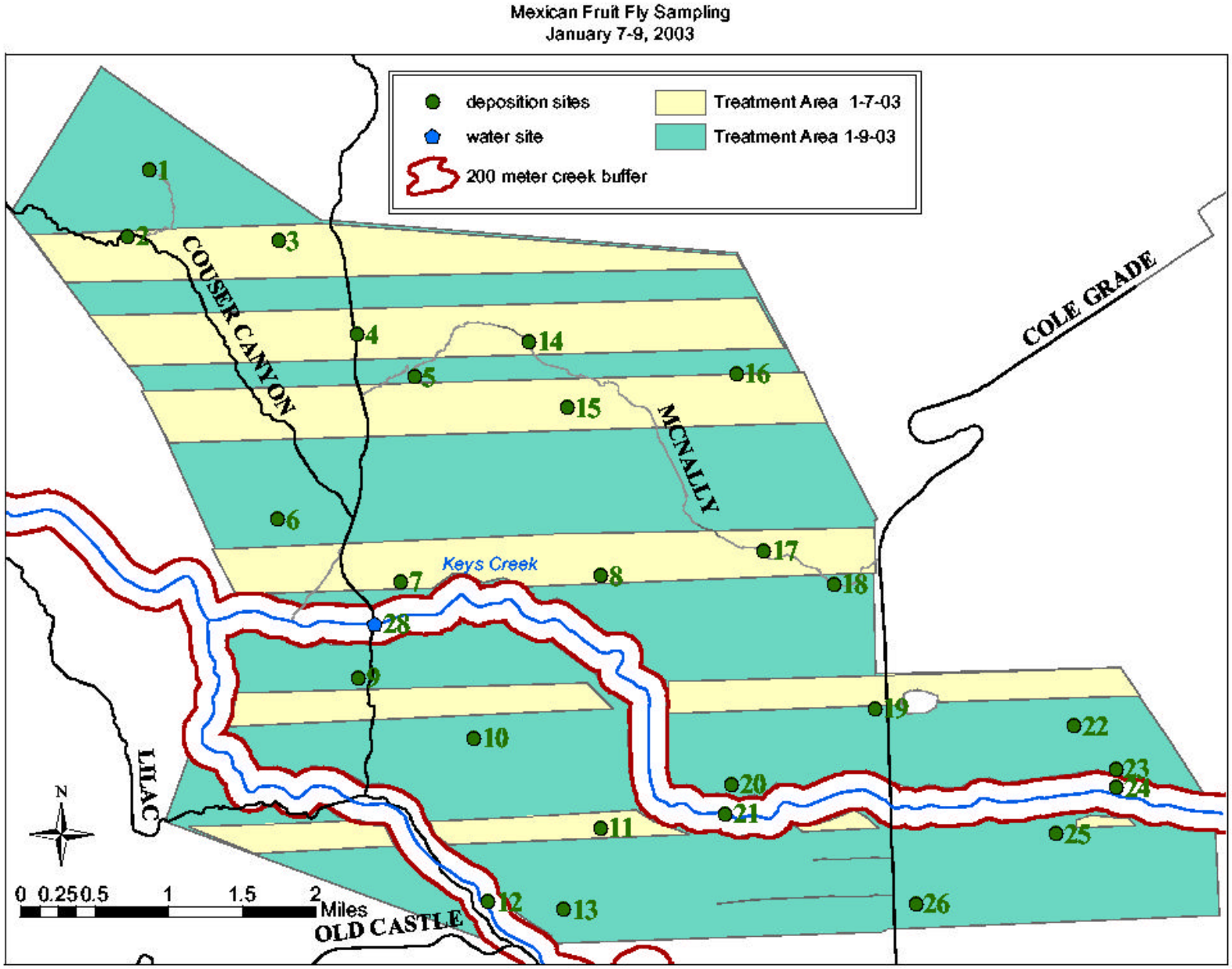
[a] None Detected, with a detection limit of 0.025 ppb for each individual spinosyn.

Table 4. Monitoring results for concentrate and tank samples. The amount of total spinosad is sum of the individual spinosyns A, D, and B. The nominal concentrate concentration is 0.02%. The target tank mix concentration is 0.008%.

			Spinosyn (%)				
Date	**Type**	**Sampling Interval**	**A**	**D**	**B**	**Total**	**Average**
1/7/03	Concentrate	Application Day 1	0.0184	0.0026	ND[a]	0.0210	
1/7/03	Concentrate	Application Day 1	0.0177	0.0026	0.0003	0.0206	0.0208
1/7/03	Mixture	Application Day 1	0.0177	0.0025	ND	0.0202	
1/9/03	Mixture	Application Day 2	0.0078	0.0011	0.0001	0.0090	

[a] None Detected, with a detection limit of 0.0001%

Figure 1.


Mexican Fruit Fly Sampling
January 7-9, 2003
deposition sites
water site
200 meter creek buffer
Treatment Area 1-7-03
Treatment Area 1-9-03
COUSER CANYON
COLE GRADE
MCNALLY
Keys Creek
LILAC
OLD CASTLE
N
0 0.250.5 1 1.5 2 Miles
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